

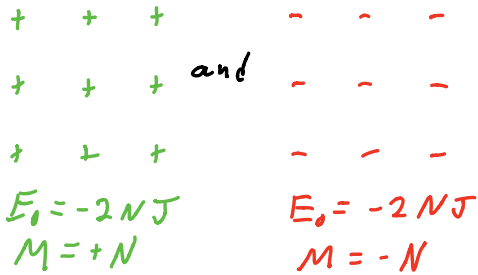
2D Square Ising Low T Series

$$H = -J \sum_{\langle ij \rangle} \sigma_i \sigma_j \quad Z = \sum_{\vec{\sigma}} e^{-\beta H} \quad \beta J \gg 1$$

As $T \rightarrow 0$, 2 configurations dominate:

$$\therefore Z \approx 2 e^{2N\beta J} + \text{small corrections}$$

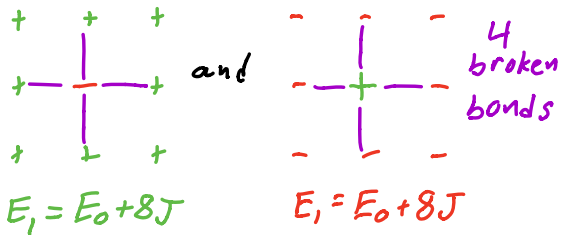
↑
 Ω_0 (ground state degeneracy)



Next term at $0 < T \ll J/k_B$:

$$Z = \Omega_0 e^{-\beta E_0} \{ 1 + N e^{-8\beta J} + \dots \}$$

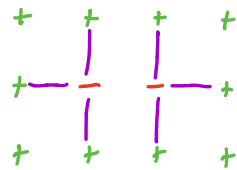
N positions $x^4, x \equiv e^{-2\beta J}$



Symbol • flipped spin

Alternate symbol L-bisectors of broken bonds • $N x^4$

Next term:



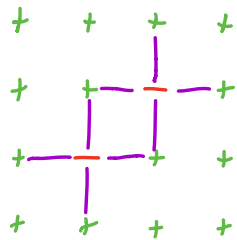
6 broken bonds
2N positions
+ orientations

Symbol —•— $2N x^6$
Alternate

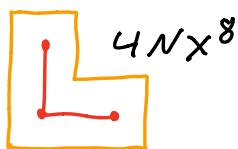
Next term:

$$\frac{1}{2} N(N+9) x^8$$

in total



$N-5$ positions
 $N(N-5)/2 x^8$
↑ interchange
N Positions
5 forbidden sites



$$Z = \Omega_0 e^{-\beta E_0} \left\{ 1 + N x^4 + 2N x^6 + \frac{1}{2} N(N+9) x^8 + 2N(N+6) x^{10} + \dots \right\}$$